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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/640,519	08/17/00	NAKAURA	0819-408

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EXAMINER

VU, D

ART UNIT	PAPER NUMBER
2818	

DATE MAILED: 09/26/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/640,519

Applicant(s)

NAKAOKA ET AL.

Examiner

DAVID VU

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 July 2001.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892)
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 18) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1,3,5-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Hsu et al (US 5,707,889).

Regarding claims 1 and 5-7, Hsu et al, in related text and figure (Figure.4) disclose a method of fabricating a semiconductor device, the method comprising the steps of:

- (a) forming a silicon oxynitride film²¹ on a substrate²⁰; (Col.3, Line 65 – Col.4, Line.2)
- (b) performing a heat treatment, while keeping a surface of the silicon oxynitride film 21 in contact with a gas containing nitrogen, to introduce at least nitrogen into the silicon oxynitride film²¹; (Col.4, Lines. 10-20 and Col.4, Lines. 26-30)
- (c) forming a semiconductor film 31 containing an impurity (Col. 10, Line. 40 – Col. 11, Line. 32) on the silicon oxynitride film 21. (Col.4, Lines. 38-39 and Col.4, Lines. 65-66)

Regarding claim 3, Hsu et al, in related text disclose the step: forming, as the semiconductor film, an amorphous silicon film 31 on the silicon oxynitride film²¹; (Col.4, Lines. 38-39); implanting impurity ions into the amorphous silicon film; (Col.10, Line. 40 – Col.11,

Line. 32); performing a heat treatment for activating the impurity to change the amorphous film³¹ into a polysilicon film⁴¹. (Col.4, Lines.65-66)

Regarding claim 8,Hsu et al, in related text disclose the semiconductor device is a p-channel MIS transistor and a silicon film for a gate electrode containing boron is formed. (Col.8, Line. 35 – Col.9, Line. 27 and Col.13, Lines. 7-10).

Regarding claim 9,Hsu et al, in related text and figures (Fig. 4-5) disclose a silicon nitride layer 42 is formed over the silicon layer 41. (Col.6, Lines. 50-65)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hsu et al (US 5,707,889) in view of Sung (US 6,040,216)

Hsu et al., disclose all claimed subject matter, but omits the forming of silicon oxynitride from N₂O gas.

Sung, in related text disclose the silicon oxynitride film is formed by using an N₂O gas (Col.4, Lines. 42-64). It would have been obvious to one of ordinary skill in the art at the time

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the invention was made to form a silicon oxynitride film by using N₂O gas because the nitrogen gas converts into a nitrogen ion, which is accelerated into the surface of the substrate.

3. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hsu et al (US 5,707,889).

Hsu et al., disclose all claimed subject matter, but lacks to mention the temperature range for the heat treatment.

Hsu et al., in related text disclose the annealing ambient typically includes an inert gas (Col.4, Lines. 10-20).

Furthermore, the temperature is considered to involve routine optimization which has been held to be within the level of ordinary skill in the art. As noted in *In re Aller*, the heat treatment temperature, etc. would have been obvious: "Normally, it is to be expected that a change in energy, concentration, thickness, dosage, temperature, or combination of any of them would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art such ranges are termed "critical ranges and the applicant has the burden of proving such criticality.... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller* 105 USPQ233, 255 (CCPA 1955). See also *In re Waite* 77 USPQ 586 (CCPA 1948); *In re Scherl* 70 USPQ 204 (CCPA 1946); *In re Irmischer* 66 USPQ 314 (CCPA 1945); *In re Norman* 66 VSPQ 3 08 (CCPA 1945); *In re Swenson* 56 USPQ 3 72 (CCPA 1942); *In re Sola* 25

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USPQ 433 (CCPA 1935); In re Dreyfus 24 USPQ 52 (CCPA 1934). Therefore, one of ordinary skill in the requisite art at the time the invention was made would have used any temperature range suitable to the method in process of Hsu et al., in order to reduce the stress at the substrate-silicon oxynitride layer.

4. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hsu et al (US 5,707,889) in view of Gardner et al. (US 6,144,071)

Hsu et al., disclose all claimed subject matter, but omits the forming of sidewall with a L-shape.

Gardner et al., in related text and figure (Fig. 20) disclose the first side wall with a L-shape⁴⁵ cross section view is formed on the sides of the gate electrode 23 and a second side wall 46 that spreads over the side and base of the first side wall. (Col. 11, Lines. 53-67). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form a L-shape space as claimed in Applicant's invention to prevent outdiffusion of impurities from substrate and to assist in prevention of bridging in the event of silicidè formation.

Response to Arguments

5. Applicant's arguments with respect to claims 1-8 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office

action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Vu whose telephone number is (703) 305-0391. The examiner can normally be reached on Monday-Friday from 8:00am to 5:00pm.

If attempt to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms., can be reached on (703) 308-4910.

David Vu

DV

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David Nelms
Supervisory Patent Examiner
Technology Center 2800